

# ***PBEEEP***

## ***State Government***

**Public Buildings Enhanced Energy Efficiency Program**

### **SCREENING RESULTS FOR MESABI RANGE COMMUNITY AND TECHNICAL COLLEGE -EVELETH**



**August 23, 2011**

### Summary Table

<b>Mesabi Range Eveleth Campus</b>	
Location	1100 Industrial Park Dr Eveleth, MN 55734
Facility Manager	Phil Kuopus
Number of Buildings	1
Interior Square Footage	84,373
PBEEEP Provider	Center for Energy and Environment (Neal Ray)
State's Project Manager	
Date Visited	January 12, 2011
Annual Energy Cost (from B3)	\$102,839.27 (2009)
Utility Company	MN Power ( Electricity), MN Energy Resources (Natural Gas)
Site Energy Use Index (from B3)	64.22 kBtu/sq ft(2009)
Benchmark EUI (from B3)	34.48 kBtu/sq ft

### Screening Overview

The goal of screening is to select buildings where an in-depth energy investigation can be performed to identify energy savings opportunities that will generate savings with a relatively short (1 to 5 years) and certain payback. The screening of Mesabi Range Community and Technical College Eveleth was performed by the Center for Energy and Environment (CEE) with the assistance of the facility staff. A walk-through was conducted on January 12, 2011 and interviews with the facility staff were carried out to fully explore the status of the energy consuming equipment and their potential for recommissioning. This report is the result of that information.

The Mesabi Range Community and Technical College Eveleth is an 84,373 square foot (sqft) building located in Eveleth, MN. The building consists of primarily college laboratory.

### Recommendation for Investigation

Due to Eveleth's low energy use, scheduling of mechanical equipment, and operation of mechanical equipment CEE does not recommend any further investigation.

<b>Building Name</b>	<b>State ID</b>	<b>Square Footage</b>	<b>Year Built</b>
Mesabi Range Community and Technical College Eveleth	E26257T0169	84,373	1969

## **Building Overview Section**

### ***Mechanical Equipment***

### ***Controls and Trending***

### ***Lighting***

### ***Energy Use Index B3 Benchmark***

The site Energy Use Index (EUI) for the building is 64.22 kBtu/sq ft.

### ***Metering***

The building contains one electrical meter, one propane meter, and one natural gas meter.

### **Documentation**

### ***Occupancy.***

<b>Mechanical Equipment Summary Table</b>	
<b>Quantity</b>	<b>Equipment Description</b>
	Honeywell EBI Automation System
	Building
	Interior Square Feet (before 1,200 sqft addition)
	Air Handlers
	VAV Boxes (113 with reheats and 154 without)
	Fan powered VAV boxes
	FCUs
	Water to Water Heat Exchangers
	Hot Water Pumps
	Chilled Water Pumps
	Dry Coolers
	Pumps associated with glycol and CRAC units
	CRAC Units
	Hot water pumps for AHU coils
	CUHs
	HUHs
	VUHs
	Power Roof Ventilators
	Exhaust Fans
	Approximate number of points for trending

## Building Summary Table

The following tables are based on information gathered from interviews with facility staff, a building walk-through, automation system screen-captures, and equipment documentation. The purpose of the tables is to provide the size and quantity of equipment and the level of control present in each building. It is complete and accurate to the best of our knowledge.

Main Building State ID# E26257T0169					
Area (sqft)	84373	Year Built	1969	EUI/Benchmark	64/34 (2009)
HVAC Equipment					
Air Handlers (Total)					
Description	Type	Size	Notes		
AHU 1	AHU	7395 cfm, 10 hp	Commons		
AHU 2	AHU	2800 cfm, 1.5 hp	Communications		
AHU 3	AHU	5760 cfm, 10 hp	South Classroom		
AHU 4	AHU	5335 cfm, 10 hp	Lecture Hall		
AHU 5	AHU	7510 cfm, 10hp	Library		
AHU 6	AHU	3000 cfm	Child care		
AHU 7	AHU	7540 cfm, 15 hp	North Science Lab		
AHU 8	AHU	8170 cfm, 15 hp	South Science Lab		
AHU 9	AHU	3300 cfm	Arrowhead Offices		
AHU 10	AHU	6640 cfm, 7.5 hp	Shipping		
AHU 11	AHU	1000 cfm, 1.0 hp	Photolab		
AHU 12	AHU	2800 cfm	Mezzanine		
AHU 13	AHU	5590 cfm, 7.5 hp	Computer Lab		
MAU 2	Make Up	8825 cfm, 1.0 hp	Mezzanine- MES Shop		
MUA 3	Make Up	8466 cfm, 1.0 hp	Mezzanine-Welding Shop #1		
MUA 4	Make Up	8557 cfm, 1.0 hp	Mezzanine- Welding Shop #2		
AHU-1	ASF-1	1686 cfm	Auditorium		
AHU-2	ASF-2	2622 cfm	Classroom		
AHU-3	ASF-3	335 cfm	Offices		
ASF-1	AHU1	5620 cfm			
ASF-2	AHU-2	9425 cfm			
ASF-3	AHU-3	1688 cfm			

## HVAC Equipment Cont'd

### Cooling Tower Unit ( xTotal)

Description	Type	Size	Notes
T1		2760 mbh, 690 gpm	

### Chiller (x Total)

Description	Type	Size	Notes
H1		2923 mbh, 406 gpm evap, 690 gpm cond	28 GPM MIN Flow

### Heat exchanger (x Total)

Description	Type	Size	Notes
HE 1		375 gpm	
HX1	Air to air		Mezzanine Graphic arts
HX2	Plate/Frame	27.8 gpm primary, 10 secondary	Boiler rm

### Hot Water System

Description	Type	Size	Notes

### Exhaust Fans (x Total)

Description	Type	Size	Notes
F1		6150 cfm, 2hp	Commons
F2			
F3A		2330 cfm, 1/3 hp	South Classroom
F3B		2670 cfm, 1/2 hp	South Classroom
F4		5335 cfm, 2hp	Lecture
F5A		2650 cfm, 1/2 hp	Original Library
F5B		4860 cfm, 1/2 hp	Original Library
F6			
F7		7540 cfm, 2 hp	North Science Labs
F8A		6400 cfm, 2 hp	South Science Labs
F8B		1700 cfm, 1hp	South Science Labs
F8C		2550 cfm, 1/2 hp	South Science Labs
F8D		300 cfm, 1/4hp	South Science Labs
F9			
F10A		340 cfm, 1/6hp	Chiller
F10B		2900 cfm, 3/4 hp	Chiller
F11		600 cfm, 1/6 hp	Photolab
F12			
F13A		2855 cfm, 3/4 hp	Computer Lab
F13B		1120 cfm, 1/6 hp	Computer Lab

## HVAC Equipment Cont'd

### Water to Air Pump(6 total)

Description	Type	Size	Notes
Water to Air	Pump	3600cfm	
Water to Air	Pump	1060 cfm	
Water to Air	Pump	2000 cfm	
Water to Air	Pump	300 cfm	
Water to Air	Pump	340 cfm	
Water to Air	Pump	455 cfm	

### UH (Total)

Description	Type	Size	Notes
UH-2		350-1600 cfm, 17 mbh	Lunch room ceiling
UH 3		350-1600 cfm, 17 mbh	Lunch room ceiling
UH 4		350-1600 cfm, 17 mbh	Lunch room ceiling
UH-1	H	380 cfm, 18.8 mbh	Qty-6
UH-2	CUH	320 cfm, 25.6 hp	

### Boiler Schedule

Description	Type	Size	Notes
Blr 1		750 mbh	Boiler room boiler
Blr 2		750 mbh	Boiler room boiler
Blr 3		750 mbh	Boiler room boiler

## HVAC Equipment Cont'd

**Fans (Total)**

Description	Type	Size	Notes
HPU 1		1034 cfm, 1/3 hp	
EF3	Exhaust Fan-Gen	4000cfm, 1.5 hp	
EF 5	Exhaust Fan-Existing Welding	2400 cfm, 2 hp	
EF 6	Exhaust Fan-Existing Welding	4500 cfm, 3 hp	
EF 7	Exhaust Fan-Existing Welding	2400 cfm, 2 hp	
EF 8	Exhaust Fan-Gen	2000 cfm, 2 hp	
EF 9	Exhaust Fan-Existing Welding	2400 cfm, 2 hp	
EF 10	Exhaust Fan-Gen	2000 cfm, 2hp	
RF 1	Return Fan HPU 1	1000 cfm, ½ hp	
RF 2	Return Fan HPU 2	1000 cfm, ½ hp	
RF 3	Return Fan HPU 3	1000 cfm, ½ hp	
HPU-2		1062 cfm, 1/3 hp	
HPU-3		1059 cfm, 1/3 hp	
HPU-4		2957 cfm, 2hp	
HX 1 supply		1292 cfm, 1.0 hp	
HX 1 Exhaust		1513 cfm, 1.5 hp	
HPU-1		1034 cfm, 1/3 hp	

**Pumps (Total)**

Description	Type	Size	Notes
CDWP 1	Condenser Water Pump	145.0 gpm, 7.5 hp	Boiler Room
CDWP 2	Condenser Water Pump	145.0 gpm, 7.5 hp	Boiler Room
CDWP 3	Condenser Water Pump	145.0 gpm, 7.5 hp	Boiler Room
CDWP 4	Condenser Water Pump	145.0 gpm, 7.5 hp	Boiler Room
CDWP 5	Condenser Water Pump	60 gpm, 3 hp	Mezzanine Exh Heat Pump
CDWP 6	Condenser Water Pump	60 gpm, 3 hp	Mezzanine Exh Heat Pump
HWP 1	Heating Water Pump	170 gpm, 7.5 hp	Boiler Room
HWP 2	Heating Water Pump	170 gpm, 7.5 hp	Boiler Room
HPU 1	Heat Pump	1000 cfm	Corridors 101 Classroom
HPU 2	Heat Pump	1000 cfm	Corridors 102 Classroom
HPU 3	Heat Pump	1000 cfm	Corridors 104 Classroom
HPU 4	Heat Pump	3000 cfm	Mezzanine Graph Arts
P1	Pump	406 gpm, 7.5 hp	VSD
P2	Pump	690 pm, 10hp	VSD
P3	Pump	375.2 gpm, 7.5 hp	VSD



**Points on BAS****Air Handlers**

Description	Points
MUA 1-4	Supply Air Sensor, Fan Status, Fan Start, OA, Exhaust Air, Return Air, Supply Air

**Boilers**

Description	Points
Boilers	DomHW Stpt, DWS, Hx2Vlv, OSA, HWS, HWR, Blr loop press, VFD Speed, HWP1Ena, HWP2Ena, Blr demand status, Blr 1 fault, Blr 2 fault, Blr 3 fault

**Chilled Water System**

Description	Points

**HPU4**

Description	Points
HPU4	OSA, Hx1Ena, Space Stpt, Space Temp, Rtn Dmprs, RAS, SAS, Comp Stage 1, Comp Stage 2

## Points on BAS Cont'd

### Fan Coil Units

Description	Points

### Hot Water System

Description	Points

### CUH

Description	Points

### VUH

Description	Points

### HUH

Description	Points

### Pumps

Description	Points
Pumps	OSA, Htg Pumprtn sensor, Vlv 1a,1b,2a,2b, Cooling tower 1 & 2, CWP 1 Ena, CWP 2 En, CWP 3 Ena, CWP 4 Ena, Vlv 3 Press Sens, Vlv 3 Bypass, Vlv 4 Bypass Press, Vlv 4 Bypass
Secondary Cooling Pumps	Htg PumpRtn Sens, Htg Pump Vlv, CWPS 5 Ena, CWPS 6 Ena, SCWHP 1 Ena, SCWHP 2 Ena, SCWHP 3 Ena, SCWHP 4 Ena, OSA, Cooling towers

Abbreviation Descriptions			
AHU	Air Handling Unit	HUH	Horizontal Unit Heater
BAS	Building Automation System	HRU	Heat Recovery Unit
CD	Cold Deck	HW	Hot Water
CDW	Condenser Water	HWDP	Hot Water Differential Pressure
CDWRT	Condenser Water Return Temperature	HWP	Hot Water Pump
CDWST	Condenser Water Supply Temp	HWRT	Hot Water Return Temperature
CFM	Cubic Feet per Minute	HWST	Hot Water Supply Temperature
CHW	Chilled Water	HX	Heat Exchanger
CHWRT	Chilled Water Return Temperature	kW	Kilowatt
CHWDP	Chilled Water Differential Pressure	kWh	Kilowatt-hour
CHWP	Chilled Water Pump	MA	Mixed Air
CHWST	Chilled Water Supply Temperature	MA Enth	Mixed Air Enthalpy
CRAC	Computer Room Air Conditioner	MARH	Mixed Air Relative Humidity
CUH	Cabinet Unit Heater	MAT	Mixed Air Temperature
CV	Constant Volume	MAU	Make-up Air Unit
DA	Discharge Air	OA	Outside Air
DA Enth	Discharge Air Enthalpy	OA Enth	Outside Air Enthalpy
DARH	Discharge Air Relative Humidity	OARH	Outside Air Relative Humidity
DAT	Discharge Air Temperature	OAT	Outside Air Temperature
DDC	Direct Digital Control	Occ	Occupied
DP	Differential Pressure	PTAC	Packaged Terminal Air Conditioner
DSP	Duct Static Pressure	RA	Return Air
DX	Direct Expansion	RA Enth	Return Air Enthalpy
EA	Exhaust Air	RARH	Return Air Relative Humidity
EAT	Exhaust Air Temperature	RAT	Return Air Temperature
Econ	Economizer	RF	Return Fan
EF	Exhaust Fan	RH	Relative Humidity
Enth	Enthalpy	RTU	Rooftop Unit
ERU	Energy Recovery Unit	SF	Supply Fan
FCU	Fan Coil Unit	Unocc	Unoccupied
FPVAV	Fan Powered VAV	UH	Unit Heater
FTR	Fin Tube Radiation	VAV	Variable Air Volume
GPM	Gallons per Minute	VFD	Variable Frequency Drive
HD	Hot Deck	VIGV	Variable Inlet Guide Vanes
HP	Horsepower	VUH	Vertical Unit Heater

**Conversions:**

1 kWh = 3.412 kBtu

1 Therm = 100 kBtu

1 kBtu/hr = 1 MBH